

Proposed Plan for Waste Area Group 9 - Argonne National Laboratory - West Idaho National Engineering and Environmental Laboratory



IDAHO DEPARTMENT
OF HEALTH AND WELFARE
DIVISION OF
ENVIRONMENTAL QUALITY

(Editors Note: Technical and administrative terms are used throughout this Proposed Plan. When these terms are first used, they are printed in ***bold italics***. Explanations of these terms, document references, and other helpful notes are provided in the margins.)

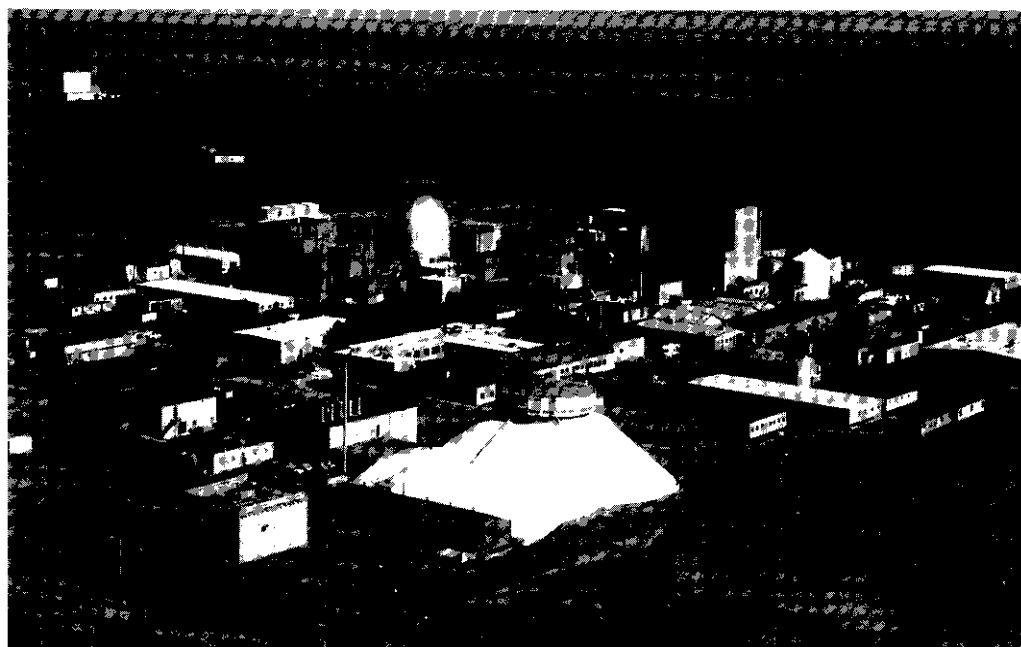


Figure 1. 1997 Photo of the Argonne National Laboratory - West Facility.

Introduction

The Department of Energy has prepared this document to address alternatives to cleanup contamination at inactive waste sites at Argonne National Laboratory-West (ANL-W) that pose an unacceptable risk to human health and the environment. Figure 1 shows a 1997 photo of the ANL-W facility. Remediation of this contamination is being recommended in the manner described in this document. The purpose of this ***Proposed Plan*** is three-fold: (1) to summarize the information presented in the ***Comprehensive Remedial Investigation/Feasibility Study for Argonne National Laboratory-West Operable Unit 9-04 at the Idaho National Engineering and Environmental Laboratory*** (Operable Unit 9-04 RI/FS) document; (2) to recommend remedial actions for those sites that pose an unacceptable risk to human health and the

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Public Meetings/ Briefings*

Boise

January 20, 1998
Borah High School Library

Moscow

January 21, 1998
University Inn

Idaho Falls

January 22, 1998
Shilo Inn

*See page 25 for details

Briefings for other communities can be arranged by calling the INEEL's toll-free number at (800) 708-2680.

Proposed Plan - document requesting public input on a proposed remedial alternative (cleanup plan).

Waste Area Groups - one of the 10 administrative management areas established under the INEEL Federal Facility Agreement and Consent Order (FFA/CO). Argonne National Laboratory - West is designated as Waste Area Group 9.

Federal Facility Agreement and Consent Order - an agreement between the EPA, state of Idaho, and DOE to evaluate waste disposal sites at the INEEL and perform remediation if necessary.

Remedial Investigation/Feasibility Study (RI/FS) - studies required by CERCLA (see below) to characterize the nature and extent of contamination because of past releases of hazardous and radioactive substances to the environment, to assess risks to human health and the environment from potential exposure to contaminants, and to evaluate cleanup actions.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) - a federal law that establishes a program to identify, evaluate, and remediate sites where hazardous substances may have been released, leaked, poured, spilled, or dumped into the environment.

How You Can Participate

Whether you are new to the INEEL and are reading this type of document for the first time, or you are familiar with the Superfund process, you are invited to:

- **Read** this proposed plan and review additional documents in the Administrative Record file at the Information Repository locations listed on page 18; and access documents via the Internet at <http://ar.inel.gov/home.html>
- **Call** the INEEL's toll-free number at (800) 708-2680 to ask questions, request information, or make arrangements for a briefing.
- **Attend** a public meeting listed on the cover and on page 25
- **Comment** on this plan at the meeting or submit written comments (see postage-paid comment form on back cover)
- **Contact** state of Idaho, EPA Region 10, or DOE project managers (see pages 3, 4, and 7).

environment; and (3) to provide the vehicle through which the U.S. Department of Energy (DOE), the state of Idaho Department of Health and Welfare (IDHW), and the Environmental Protection Agency (EPA) Region 10 solicit public input concerning cleanup alternatives.

The ANL-W site is identified as **Waste Area Group 9 (WAG 9)** in the Idaho National Engineering Laboratory (INEL) **Federal Facility Agreement and Consent Order (FFA/CO)**. The OU 9-04 Comprehensive RI/FS for WAG 9 represents the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)** investigation for the ANL-W facility. Because this is the comprehensive investigation, risks were calculated for individual release sites for all exposure pathways and cumulatively for the ingestion of groundwater and inhalation of groundwater and fugitive dust exposure pathways. Extensive investigations have been conducted since 1991 to determine the nature and extent of contamination at potential and known release sites. The investigations were conducted through personnel interviews, review of operating procedures, review of purchase requisitions, and collection and analysis of field data.

The OU 9-04 Comprehensive RI/FS, contains three major sections; the remedial investigation, the baseline risk assessment, and the feasibility study. The remedial investigation (Sections 3 and 4) identifies the types, quantities, depths, and locations of contaminants in the WAG 9 release sites. The potential impacts to human health and the environment from the exposure of these contaminants were calculated in the **baseline risk assessment** (Section 5 for human health and Section 6 for the environment). For those sites with a potential for adverse impacts to human health and the environment, alternative ways for addressing the contamination were developed and evaluated in the feasibility study (Sections 7 through 10). This Proposed Plan summarizes each of the three major sections of the OU 9-04 Comprehensive RI/FS. Additional details on the OU 9-04 Comprehensive RI/FS and other precursor documents can be found in the Operable Unit 9-04 **Administrative Record** for WAG 9 at the INEEL Information Repositories.

Agency Involvement

This document was prepared by the U.S. Department of Energy, the U.S. Environmental Protection Agency, and the Idaho Department of Health and Welfare, collectively referred to as "the agencies". The agencies are presenting this Proposed Plan as a component of their public participation responsibilities under Section 117(a) of the CERCLA, commonly known as the "Superfund Program".

Community Acceptance

Community acceptance is an important criterion the agencies must evaluate during the process of remedy selection. The agencies will gauge the degree of community acceptance through open dialogue with citizens and through the comments submitted by the public concerning the remedial alternatives identified in the ANL-W Proposed Plan. This interaction is critical to the CERCLA process for making sound environmental decisions that are protective of human health and the environment. Although the agencies have proposed an alternative for controlling

risks at ANL-W, the public is encouraged to review and comment on all of the alternatives, not just the preferred one. The agencies will select a final remedy after reviewing and considering information and comments submitted by the public during the public comment period of January 8, through February 7, 1998. Written comments must be received by February 7, 1998. Additional information supporting the recommended remedial action is available in the Operable Unit 9-04 Administrative Record for WAG-9 at the INEEL Information Repositories.

The actual selection of a remedial alternative will not be made until all comments received during the public comment period have been reviewed and addressed. The agencies will consider all public comments on this proposed plan in preparing a **Record of Decision**. Depending on comments received, the final remedial action plan presented in the Record of Decision may differ from the preferred alternative identified in this plan. The **Responsiveness Summary** section of the Record of Decision will include all written and verbal comments along with the DOE responses.

Preferred Alternative

The OU 9-04 Comprehensive RI/FS shows that two sites have radiologically contaminated soils that pose unacceptable risks to human health and five sites that pose potentially unacceptable risks to the environment because of inorganic contaminants. Because of similarities of contaminants and soil types, ANL-W used two soil categories in evaluating the alternatives. These soil categories are; (1) radiologically contaminated soils, and (2) soils with excessive inorganic contaminants. Table 1 shows the sites that were retained because of the risks to human health and/or the environment and their corresponding soil category.

Five alternatives were retained for detailed analysis in the feasibility study for the two soil categories. These alternatives are as follows: no action; containment with engineered barrier; excavation and disposal at the proposed INEEL **Soil Repository**, excavation and disposal at private off-site facility; and **Phytoremediation** with subsequent disposal of residual matter off-site. Based on evaluation of these five alternatives with respect to the evaluation criteria; the agencies are recommending phytoremediation as the preferred remediation method. This selection is contingent on the results of bench-scale testing. If the bench-scale test results show that phytoremediation does not work on soils and contaminants at ANL-W or that the uptake percent of contaminants is lower than acceptable, the contingent alternative of excavation and disposal at the proposed INEEL Soil Repository will then be selected. The proposed INEEL Soil Repository is currently being evaluated in the Operable Unit 3-13 Comprehensive RI/FS. The proposed INEEL Soil repository may, or may not, be built depending on State and Community Acceptance of the preferred alternatives for Operable Unit 3-13. The results of the bench-scale testing for phytoremediation will be completed early in the summer of 1998. All of the alternatives considered for ANL-W are explained in the section entitled Summary of Alternatives.


Baseline risk assessment - an assessment required by CERCLA to evaluate potential risks to human health and the environment.

Administrative Record - documents including correspondence, public comments, Records of Decision, and technical reports upon which the agencies base their remedial action selection. The titles of additional information associated with this proposed plan that are available through the Administrative Record file are shown on page 17 of this plan.

Record of Decision - a public document that identifies the selected remedy at a site, outlines the process used to reach a decision on the remedy, and confirms that the decision complies with CERCLA.

Responsiveness Summary - the part of the Record of Decision that summarizes and provides responses to comments received on a proposed action for a site during the public comment period.

Soil Repository - a Operable Unit 3-13 site previously identified in the FFA/CO that is scheduled for remediation.



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The Idaho Department of Health and Welfare is one of the three agencies identified in the INEEL Federal Facility Agreement and Consent Order, which establishes the scope and schedule of remedial investigations at the INEEL. Correspondence by the Division of Environmental Quality staff concerning this project can be found in the Administrative Record for this project under Operable Unit 9-04.

For additional information concerning the State's role in preparing this proposed plan, contact:

Dean Nygard
Idaho Department of Health and Welfare
Division of Environmental Quality
1410 N. Hillen
Boise, ID 83706
(208) 373-0265, (800) 232-4635

Phytoremediation - using plants to remove contaminants from the soils.

CERCLA 5-year Review Process -

CERCLA and the FFA/CO, provide that the Environmental Protection Agency and the Idaho Department of Health and Welfare may review response actions for sites that allow hazardous substances to remain on-site above the established remedial action levels, no less often than every 5-years after the initiation of the cleanup action, to ensure that human health and the environment are being protected by the cleanup being implemented. If upon review it is the judgement of EPA and IDHW that additional action is appropriate, the EPA and IDHW may require the DOE to implement additional work. (See FFA/CO, sec. XXII, page 38.)

National Priorities List - a formal listing of the nation's hazardous waste sites as established by CERCLA that have been identified for possible remediation. Sites are ranked by the EPA based on their potential for affecting human health and the environment.



The U.S. Environmental Protection Agency is one of the three agencies identified in the INEEL Federal Facility Agreement and Consent Order, which establishes the scope and schedule of remedial investigations at the INEEL. Correspondence by the Region 10 staff concerning this project can be found in the Administrative Record under Operable Unit 9-04.

For additional information concerning the EPA's role in preparing this proposed plan, contact:

Wayne Pierre
Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101
(206) 553-7261

The possibility exists that a contaminated media not identified by the FFA/CO or in the OU 9-04 Comprehensive RI/FS will be discovered in the future as a result of routine operations, maintenance activities, and/or decontamination and dismantlement activities at ANL-W. Upon discovery of a new source by the agencies, that site will be evaluated and appropriate response actions taken in accordance with the FFA/CO. This process will also ensure that any changes in the physical configuration of any ANL-W facility or site where there is a potential for a release of a hazardous substance (such as decontamination and dismantlement or facility renovation and or modification) will be managed to achieve the remediation goals that are consistent with those established in the OU 9-04 Record of decision. In addition, the CERCLA 5-year review process is only necessary if hazardous substances remain on-site above the established remedial action levels (i.e., for alternative 3a, with no treatment or removal of the contaminants and the soils capped at ANL-W).

Site Background

The INEEL is an 890-square-mile DOE facility on the Eastern Snake River Plain in southeastern Idaho whose primary mission is the integration of engineering, applied science, and operations in an environmentally conscious, safe, and cost-effective manner. The Eastern Snake River Plain is a relatively flat, semiarid sagebrush desert. The plain is bounded on the north and west by the Lost River, Lemhi, and Bitterroot mountain ranges. Drainage around and within the Eastern Snake River Plain recharges the Snake River Plain Aquifer. The top of the aquifer is approximately 635 feet below the ANL-W site.

The INEEL lands are within the aboriginal land area of the Shoshone-Bannock Tribes. The Tribes have used the land and waters surrounding the INEEL for fishing, hunting, plant gathering, medicinal, religious, ceremonial, and other cultural uses since time immemorial. These lands and waters provided the Tribes their home and sustained their way of life. The record of the Tribes' aboriginal presence at the INEEL is considerable, and DOE has documented an excess of 1,500 prehistoric and historic archeological sites at the INEEL.

The ANL-W was established in the mid 1950's and is located approximately 30 miles west of Idaho Falls, Idaho. ANL-W houses extensive support facilities for three major reactors: Transient Reactor Test Facility (TREAT), Experimental Breeder Reactor-II (EBR-II), and the Zero Power Physics Reactor (ZPPR). These three reactor facilities along with other major experimental facilities are shown in Figure 2.

The TREAT reactor has been used mainly for safety tests for various fuel types as well as for non-reactor experiments. The EBR-II reactor is currently undergoing shutdown activities that include defueling, draining of the primary and secondary sodium filled reactor cooling loops, and placing the reactor in an industrially and radiologically safe condition. The ZPPR reactor was placed in non-occupational standby on May 14, 1992.

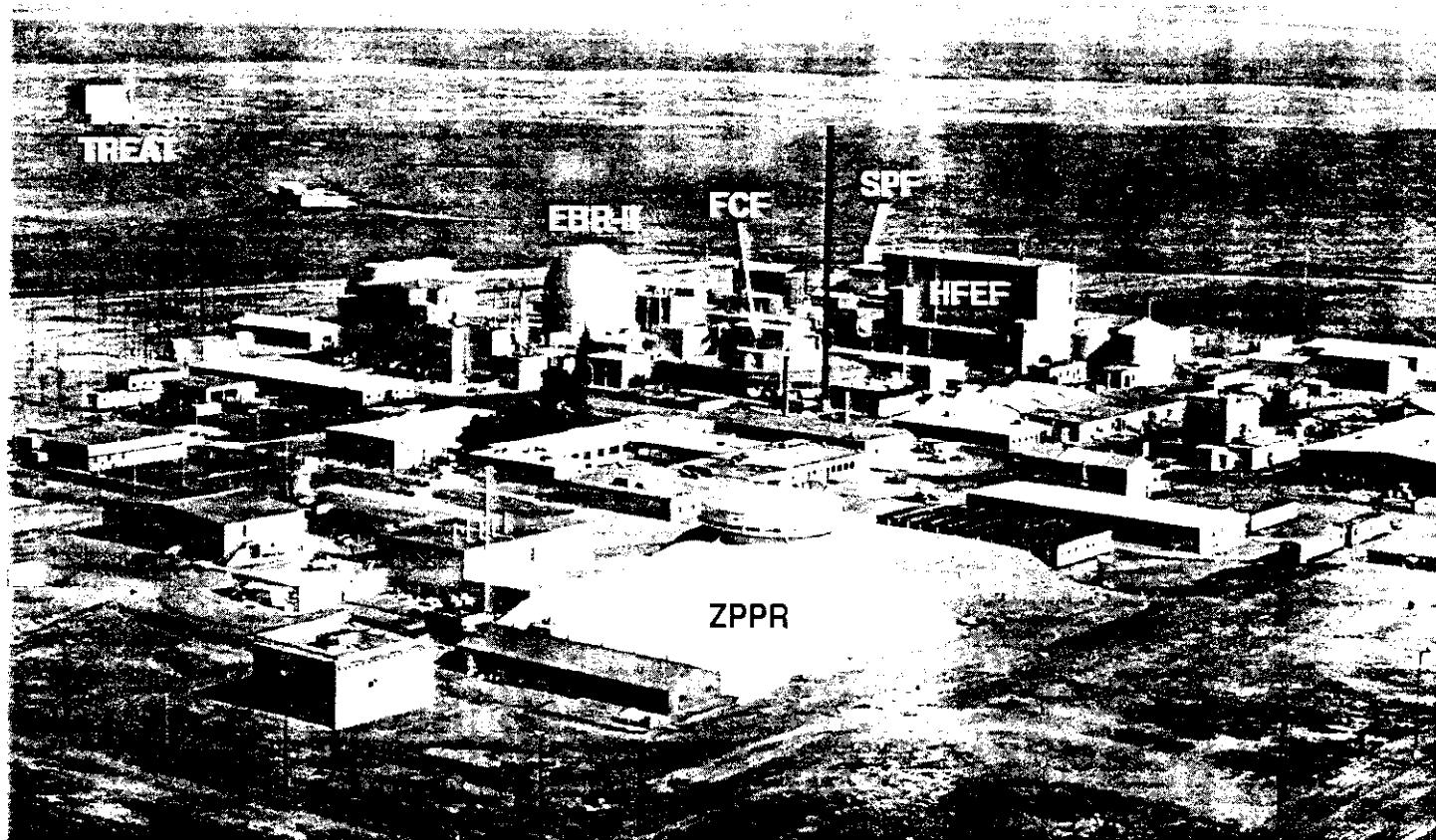


Figure 2. Aerial View of the ANL-W Facility

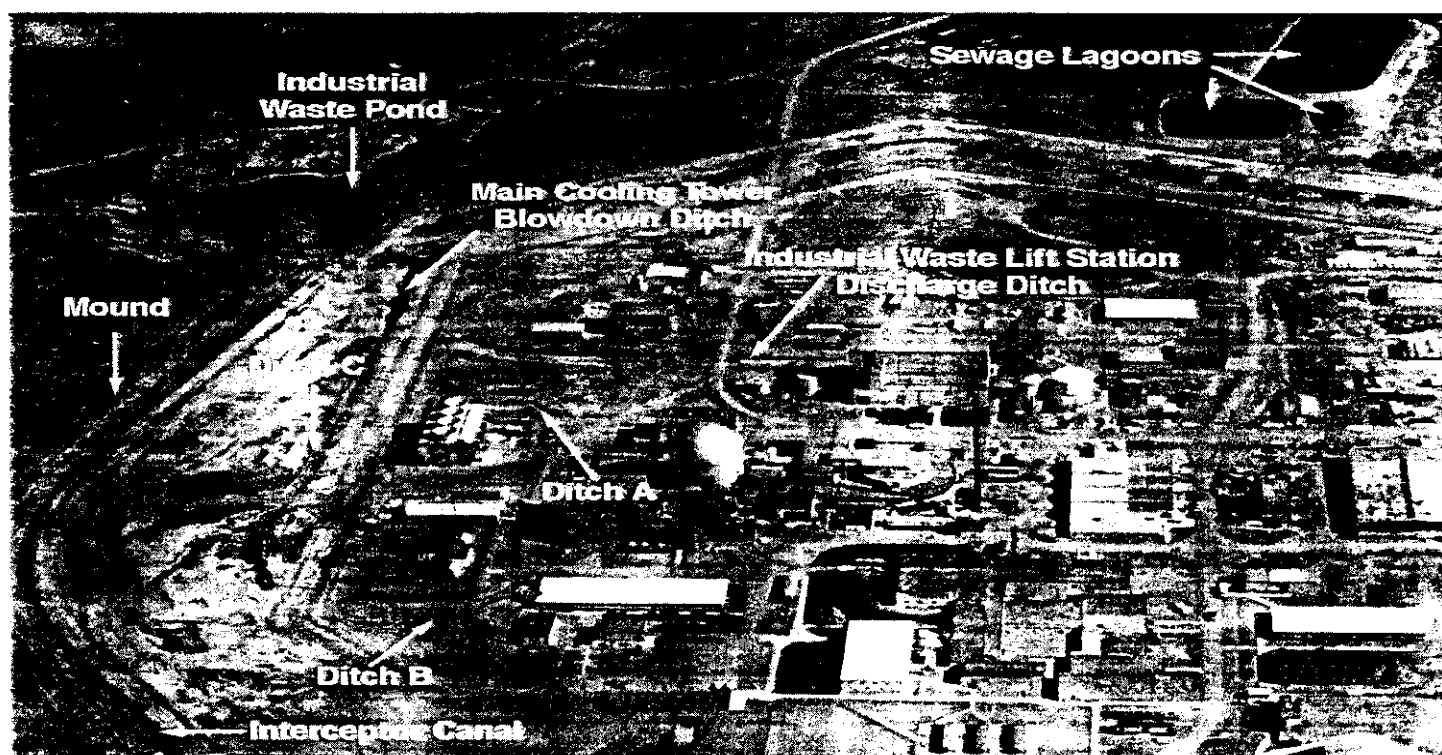


Figure 3. Sites with Unacceptable Human Health and Ecological Risks

Operable Unit - an area or areas with distinct characteristics or similar wastes grouped for efficient management.

In November 1989, the INEEL was placed on the *National Priorities List*, which identifies hazardous substance sites requiring investigation. Under CERCLA, the risks posed by hazardous substances at National Priorities List sites must be evaluated, and if necessary, appropriate remediation methods must be implemented to reduce risks to acceptable levels. The investigation of hazardous substance sites at the INEEL is implemented under a FFA/CO, which was negotiated by the agencies and signed in December 1991. A remedial investigation/feasibility study and any required cleanup of specific *operable units* (OUs) at the INEEL are guided by the agreement and its associated Action Plan. These documents provide procedures and schedules to ensure that investigations are conducted in compliance with federal and state environmental laws.

To better manage environmental investigations, the INEEL has been divided into 10 Waste Area Groups. Each Waste Area Group has been divided into OUs to expedite the investigations associated with remedial activities. Under this management system, Waste Area Group 9 covers ANL-W. In addition to the 37 sites identified at Waste Area Group 9, two sites in OU 10-06 are included in the OU 9-04 RI/FS. These two sites are located near ANL-W and the contaminants originated from the operations and maintenance of ANL-W facilities. Thus, 39 sites were evaluated in the risk assessment and 34 sites are recommended as No Further Action. The 5 sites that are retained for remedial action are shown in Figure 3, and include two sites that pose unacceptable risks to human health and the environment and three sites that pose unacceptable risks to the environment only.

Remedial Investigation

The remedial investigation for the 9-04 Comprehensive RI/FS included a reevaluation of all no action waste sites identified in the FFA/CO, a co-located facility assessment, and identification of any new sites that may have been discovered since the signing of the FFA/CO. This reevaluation of the identified sites included a review of the waste inventories to determine if any process or release may have been overlooked. Co-located facilities are those facilities at ANL-W that are currently in use and are located in the immediate vicinity of an inactive waste site. The co-located facility assessment included a review of each facility to determine if the facility is already covered under an existing environmental management program. The identification of new sites (refer to page 23 for detailed review of new sites) included an aerial fly-over along with a walk-through conducted by the agencies to determine if any new sites should be added to those being evaluated under the FFA/CO.

The preassessment screening was conducted at WAG 9 to eliminate the sites that contained no hazardous materials, and to eliminate those sites with low risks. This preassessment screening process eliminated 31 of the 39 sites from the remedial investigation. The risks for the remaining eight sites were evaluated in the risk assessment; two sites from OU 9-01, one site from OU 9-02, and five sites from OU 9-04. These eight sites along with three more were evaluated in the ecological risk assessment. These three sites that were retained and evaluated for ecological risks only are; ANL-05, ANL-29, and ANL-36. Table 1 shows the sites that were retained for evaluation in the OU 9-04 Comprehensive RI/FS. As shown in Table 1, and Table 2, the last five sites pose unacceptable risk to either human health and/or the environment and will be remediated in accordance with this Proposed Plan.

Table 1. Sites retained for evaluation in the OU 9-04 Comprehensive RI/FS.

Operable Unit	Site Code	Description	Human Health Evaluation	Ecological Risk Evaluation
9-01	ANL-04	Sewage Lagoons	retained	retained
9-01	ANL-29	Industrial Waste Lift Station	screened	retained
9-01	ANL-36	TREAT Photo Processing Discharge Ditch	screened	retained
9-01	ANL-61A	EBR-II Transformer Yard (annex)	retained	retained
9-02	ANL-08	EBR-II Leach Pit	retained	retained
9-03	ANL-05	ANL-W Open Burn Pits	screened	retained
9-04*	ANL-01	Industrial Waste Pond and Ditches (A, B, and C)	retained	retained
9-04*	ANL-01A	Main Cooling Tower Blowdown Ditch	retained	retained
9-04*	ANL-09	Interceptor Canal	retained	retained
9-04*	ANL-35	Industrial Waste Lift Station Discharge Ditch	retained	retained
9-04*	ANL-53	Cooling Tower Riser Pits	retained	retained

* These five sites show unacceptable risks for human health and the environment and will be remediated in accordance with this Proposed Plan and pending Record of Decision.

Evaluation of Risk

A baseline risk assessment was conducted to evaluate current and future potential risks to human health and the environment associated with contaminants found at ANL-W. Data obtained during the remedial investigation were used along with previously collected data, and computer modeling was performed to conduct the baseline risk assessment. Refer to Sections 5 and 6 of the OU 9-04 Comprehensive RI/FS report for specific information regarding the human health and ecological risk assessments, respectively.

Human Health Evaluation

A human health evaluation quantified non-carcinogenic (i.e., non-cancer causing) health effects and carcinogenic risk (i.e., cancer-causing). The human health risk assessment consisted of two broad phases of analysis: (1) a site and contaminant screening to identify contaminants of potential concern, and (2) an exposure route analysis for each contaminant of concern. The risk assessment includes an evaluation of human health risks associated with exposure to contaminants through (a) soil ingestion, (b) dust inhalation, (c) volatile organic compound inhalation, (d) external radiation exposure, (e) groundwater ingestion, (f) ingestion of home grown produce, (g) dermal absorption of groundwater, and (h) inhalation of water vapors as a result of indoor water use (i.e., showering). This evaluation was performed for current and future workers, and hypothetical residents 100 and 1,000 years in the future. The hypothetical future residential scenario was not evaluated prior to 100 years because it is anticipated that the land occupied by ANL-W will be used for some type of industrial purpose for at least 100 years in the future.



The U.S. Department of Energy is one of the three agencies identified in the INEEL Federal Facility Agreement and Consent Order, which establishes the scope and schedule of remedial investigations at the INEEL.

Written comments can be submitted to the U.S. Department of Energy, Chicago Operations Office - Argonne Group - West, and addressed to:

Mr. W. G. Bass
DOE Argonne Group - West
Facility Project Manager
P.O. Box 2528
Idaho Falls, ID 83403-2528

For additional information regarding the Environmental Restoration Program at the INEEL, call (800) 708-2680 or (208) 526-4700.

Carcinogenic - cancer causing

hazard index - the sum of the hazard quotients per exposure pathway. When the hazard index exceeds 1, further consideration and risk management decisions must be considered.

excess risk - a possibility of contracting cancer above the national average.

None of the non-carcinogenic contaminants exceeded the EPA standard *hazard index* of 1. The hazard index is the sum of the hazard quotients per exposure pathway. The hazard quotient is determined by dividing the actual modeled dose for each contaminant by a reference dose of the contaminant that shows no adverse effect. If the hazard quotient is greater than 1, it means the detected concentrations are greater than those that could pose adverse health threats.

The carcinogenic (cancer causing) contaminants with the greatest potential for causing adverse human health effects at Waste Area Group 9 include polychlorinated biphenyls (PCBs), and radioactive material cesium-137. CERCLA cleanup decisions are generally set at carcinogenic *excess risk* levels which exceed 1 chance in 10,000. That is to say, if exposure to site contaminants was calculated to result in one excess cancer occurrence in human population of 10,000. But, the agencies may require some type of remedial action at risk levels between 1 chance in 1,000,000 and 1 in 10,000, if necessary. In general, radionuclide contamination in shallow soils presents the greatest human health risk identified at ANL-W. In the case of PCBs, the contaminated soils near the transformer yard were excavated in 1997 and have been properly disposed at a licensed offsite location. The residual levels of PCBs currently remaining at the site are below the risk based remedial action objectives cleanup levels of 10.9 parts per million. The summary of the PCB cleanup, along with the verification samples, are available in Appendix L of the OU 9-04 Comprehensive RI/FS.

The groundwater exposure pathway is evaluated cumulatively, as well as individually, for all of the sites at ANL-W. The reason for the cumulative evaluation of the groundwater exposure pathway is that the contaminants from more than one release site could potentially reach the groundwater and they would have an additive effect on the overall quality of the groundwater. At ANL-W, the modeling of the contaminants to the groundwater shows that only arsenic and chromium exceeded the risk based screening levels. Therefore, the maximum concentrations of the arsenic and chromium at 100 years in the future were used to determine the risks to human health. The risk assessment shows that the future concentrations of arsenic and chromium result in hazard quotients of 1 or less for all exposure pathways. The carcinogenic risks from arsenic were calculated to be 3 in 10,000 for ingestion of groundwater and 1 in 1,000 for inhalation of vapors from showering. The arsenic was later screened out as a threat to human health in the risk management section of the RI/FS, because the arsenic was attributed to be from the precipitation and accumulation of naturally occurring arsenic in the groundwater which was pumped from wells for use as cooling water, and was discharged to ditches and ponds at ANL-W (Section 5.12). The maximum predicted cumulative chromium groundwater concentration from all release sites at WAG 9 was used as the source term to determine the risks to human health. The risks from chromium were within acceptable ranges for both carcinogenic and non-carcinogenic exposure routes (3 in 1,000,000 and 0.02). Thus, chromium was eliminated as a contaminant of concern for the groundwater exposure pathway.

receptors - someone or something that may receive an exposure to contaminants.

Table 2 summarizes the results of the baseline risk assessment for the sites that pose a potential risk to human health or the environment. Note that one site (ANL-09) has been separated into two subparts (the mound of previously excavated soil from the Interceptor Canal and the canal itself) based on its physical characteristics.

Ecological Risks

A Waste Area Group 9 ecological risk assessment was performed to determine which contaminants pose a potential unacceptable risk to the ecological *receptors*. Ecological receptors are animals and plants that could be exposed to contaminants at ANL-W waste sites now, or in the future. The first step of the ecological risk assessment was to perform a screening of the contaminants in the sites identified in the FFA/CO. The screening resulted in release sites identified as either a potential source of contamination and/or a pathway to ecological receptors. These sites were evaluated using the approach presented in the *Guidance Manual for Conducting Screening Level Ecological Risk Assessment for INEL*. The results of the ecological risk assessment are presented as a range of *hazard quotients* calculated for functional groups of ecological species. Because of the conservativeness of the method used to calculate these hazard quotients the ecological risk assessment resulted in the hazard quotients for some naturally occurring metals to exceed 1. In order to determine the excess risks of metals to the ecological receptors, DOE used the INEEL background (naturally occurring) concentrations to establish the background hazard quotients. The *remedial action objective* was then established to be one-order of magnitude (10 times) larger than the background (naturally occurring) hazard quotients.

At WAG 9, of the 37 sites identified in the FFA/CO and the two sites from WAG 10-06, only eight sites (ANL-01, ANL-01A, ANL-04, ANL-05, ANL-09, ANL-29, ANL-35, and ANL-36) exceeded the screening level hazard quotients. Of these eight sites, three (ANL-05, ANL-29, and ANL-36) were screened using the one-order of magnitude above background screening level. The remaining five sites (ANL-01, ANL-01A, ANL-04, ANL-09, and ANL-35) were retained for remediation because of potential adverse effects to the ecological receptors. Of these five sites, two sites (ANL-01 and ANL-09) also pose excessive risks to human health.

Uncertainty in Risk Assessments

Uncertainty is inherent in each step of the risk assessment process and detailed discussions of uncertainties are presented throughout the OU 9-04 Comprehensive RI/FS report (Section 5.12). To ensure that the risk estimates are conservative, some assumptions about the exposure are used to be protective of human health risks. For instance, future resident receptors are assumed live at the site for 30 years as opposed to the State of Idaho average of less than 10 years at the same residence. Also, the concentrations of contaminants were determined by taking the 95 percent upper confidence level of the mean versus the average concentration of contaminants at the site. As a result, calculated risks are conservative and tend to overestimate actual risks to compensate for numerous uncertainties in the assessment process. The ecological risk assessment also incorporated various adjustment factors that were designed to be conservative, and the associated risks are most likely overestimated.

Description of Sites to Be Remediated

Each of the five release sites at ANL-W that pose unacceptable risks to human health or the environment are described below. Four sites (ANL-01, ANL-01A, ANL-09, and ANL-35) are from OU 9-04 and one site (ANL-04) is from OU 9-01.

remedial action objectives - the requirements that must be met by any remedial alternative.

A complete description of these sites can be found in the OU 9-04 Comprehensive RI/FS. Figure 3 shows the location of those sites that pose unacceptable human health risks and/or sites that pose unacceptable risks to ecological receptors.

Table 2. Baseline Risk Assessment Summary.

Site	Human Health			Environment
	Occupational Scenario	Residential Scenario		Hazard Quotient ^c
	Total Cancer Risk ^(a)	Total Cancer Risk ^(a)	Hazard Index ^(b)	
Interceptor Canal Mound (ANL-09-Mound)	8 in 10,000	1 in 10,000	5	<0.1
Interceptor Canal (ANL-09-Canal)	5 in 10,000	8 in 100,000	5	100
Industrial Waste Pond (ANL-01)	9 in 10,000	4 in 10,000	5	10,000
Industrial Waste Pond Ditches A, B, and C (ANL-01)	5 in 100,000	7 in 100,000	5	10,000
Main Cooling Tower Blowdown Ditch (ANL-01A)	1 in 10,000	5 in 100,000	5	10,000
Sewage Lagoons (ANL-04)	1 in 1,000,000	1 in 1,000,000	5	1,000
Industrial Waste Liftstation Discharge Ditch (ANL-35)	6 in 100,000	1 in 100,000	5	100

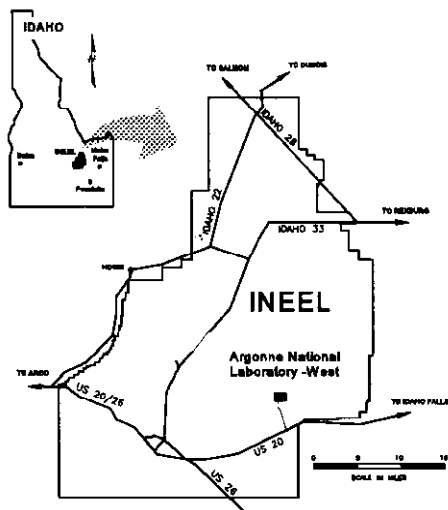
a. Unacceptable risks are those exceeding 1 chance in 1 and 1 chance in 10,000 for developing cancer. Acceptable risks are those with less than 1 chance in 10,000 for developing cancer.

b. All hazard quotients are equal to or less than 1. The hazard index shown is the sum of all hazard quotients per exposure pathway. For ANL-W the exposure pathway is ingestion of groundwater and is caused mainly from the ingestion of arsenic and fluoride. Thus, none of the sites pose adverse health effects other than cancer.

c. Hazard quotient greater than 1.0 indicates a potential for adverse health effects to the environmental receptors (e.g., birds, mammals, reptiles, or vegetation).

Sanitary Sewage Lagoons (ANL-04)—The sanitary sewage lagoons are located at the Sanitary Sewage Treatment Facility, north of the ANL-W facility. Two lagoons were constructed in 1965 along with a third built later in 1974. ANL-W has determined that the water and the sludges pose no unacceptable risks for human health. However, seven inorganics (copper, lead, mercury, selenium, silver, sodium, and zinc) in the sludge do pose unacceptable risks to the environment. Currently there is no viable exposure route to the ecological receptors (burrowing animals) as long as the Sewage Lagoons are still in use and water covers the sediments. However, in the future, after their useful life, the Sewage Lagoon sludges could pose a threat to the burrowing animals. ANL-W anticipates that the Sewage Lagoons will remain in service for the next 35 years, at which time they will be turned over to the ANL-W deactivation and decontamination program. The remaining ecological risks will be reassessed at that time using additional data collected from ANL-W and WAG 10 to determine if any remedial activities are still deemed necessary.

Industrial Waste Pond and Three Cooling Tower Blowdown Ditches (ANL-01)—The Industrial Waste Pond (IWP) is an unlined, approximately 1.2-ha (3-acre) evaporative seepage pond fed by the Interceptor Canal and other drainage ditches. The pond was excavated in 1959, has had a maximum water depth of about 4 m (13 ft), and is still being used today. The human health risk assessment indicates



Location of ANL-W with respect to the State of Idaho.

that cesium-137 in the Industrial Waste Pond poses unacceptable risk to humans, while five inorganics (chromium, mercury, selenium, silver, and zinc) in the Industrial Waste Pond pose unacceptable risks to the ecological receptors. Currently there is no viable exposure routes to humans or the ecological receptors (burrowing animals) as long as the Industrial Waste Pond is still in use, with water covering the sediments. However, in the future, after the useful life of the Industrial Waste Pond sludges could pose a threat to humans and the burrowing animals. ANL-W anticipates that the Industrial Waste Pond will continue to receive cooling water discharges from the Sodium Process Facility until December, 2001. Sometime thereafter, in order to meet human health remedial action objectives, the selected alternative will be implemented once the Industrial Waste Pond is dry.

Currently, all three ditches (i.e., Ditches A, B, and C) discharge to the Main Cooling Tower Blowdown Ditch, which then discharges to the IWP. Because of the physical separation of these ditches from the pond, each ditch (A, B, and C) and the IWP were evaluated separately. Samples were collected and analyzed for volatile and semivolatile organic compounds, metals, PCBs, pesticides, herbicides, dioxin/furans, and radionuclides. The risk assessments performed for the Ditches (A, B, and C) indicate no unacceptable human health risks, while the five inorganics (chromium, mercury, selenium, silver, and zinc) in the Ditches A, B, and C pose unacceptable risks to the ecological receptors.

The Main Cooling Tower Blowdown Ditch (ANL-01A)—The Main Cooling Tower Blowdown Ditch (MCTBD) runs from the west side of the Cooling Tower north between the security fences to the Industrial Waste Pond. It is an unlined channel approximately 213 m (700 ft) in length and 0.9 to 4.6 m (3 to 15 ft) wide. The ditch has been used from 1962 to the present to convey industrial wastewater from the Cooling Tower to the Industrial Waste Pond. The main source of impurities discharged to the Industrial Waste Pond was water treatment chemicals used to regenerate the ion exchange resin, which removes minerals from cooling water used in the EBR-II steam system. Soil samples were collected in 1987, 1988, and 1994 and were analyzed for volatile and semivolatile organic compounds, PCBs, pesticides, herbicides, dioxin/furans, metals, and radionuclides. While the human health risk assessment shows no unacceptable risks, the ecological risk assessment shows unacceptable risks to the ecological receptors due to ten inorganics (arsenic, barium, copper, lead, manganese, mercury, nickel, selenium, silver, and sodium).

The ANL-W Interceptor Canal (ANL-09)—The ANL-W Interceptor Canal was utilized to transport industrial waste to the Industrial Waste Pond and to divert spring runoff and other natural waters around the ANL-W. Between 1962 and 1975, two 4-in. pipes transported liquid industrial wastes and cooling tower effluent to the Interceptor Canal. Discharges of industrial wastes to the Interceptor Canal were discontinued in 1973, and the cooling tower blowdown discharges were discontinued in 1975. During plant dredging clean out operations at the Interceptor Canal in October 1969, abnormal background radioactivity was detected. Additional radiation surveys in 1973 and 1975 indicated that the Interceptor Canal still had some contaminated areas.

Approximately 3,471 m³ (4,540 yd³) of soil was contaminated and 948 m³ (1,240 yd³) was targeted for removal based on its higher radiation levels. Of the soil that was removed, approximately 139 m³ (182 yd³) was disposed of at the **RWMC** from 1975 to 1976. The remaining 809 m³ (1,058 yd³) of contaminated soil was removed

**RWMC - Radioactive Waste
Management Complex**

and stockpiled on site (this stockpiled soil was evaluated and removed as part of the OU 10-06 action). The remaining 2,523 m³ (3,300 yd³) of soil had relatively low levels of radioactivity and was left in the ANL-09-Mound which was investigated as part of the RI/FS report.

The Interceptor Canal site has been divided into two separate areas for the risk assessment. These two areas are the Mound which consists of the dredged material placed on the canal bank, and the Canal itself. The results of the human health risk assessment shows that cesium-137 poses unacceptable risks to humans in both the Canal and the Mound, while mercury poses unacceptable risks to the ecological receptors in the Canal area only.

The Industrial Waste Lift Station Discharge Ditch (ANL-35)—The Industrial Waste Lift Station Discharge Ditch, also known as the North Ditch, is located inside the security fences. The ditch is approximately 152 m (500 ft) in length with a bottom width of 0.91 to 1.2 m (3 to 4 ft). At any one time, there is approximately 5 to 8 cm (2 to 3 in.) of water in the ditch. The ditch receives industrial waste from most facilities at ANL-W. In 1988, soil was excavated from the North Ditch in an effort to relieve clogging in the ditch by cattails and weeds. In 1994, additional soil samples were collected and analyzed for metals and radionuclides. The risk assessment for human health shows that none of the contaminants pose unacceptable risks. The ecological risk assessment shows that three inorganics (manganese, mercury, and silver) remaining pose an unacceptable risk to the environment.

Remedial Action Objectives

Remedial action objectives (RAOs) are used to guide the determinations for remedial actions that will satisfy the objectives of protecting human health and the environment.

- For protection of human health:
 - Prevent direct exposure to radionuclide contaminants of concern (COCs) that would result in a total excess cancer risk of greater than 1 in 10,000 to 1 in 1,000,000 (1E-04 to 1E-06) to current and future workers and future residents.
- For protection of the environment:
 - Prevent exposure to COCs in soils with HQs > 10 times the HQ at background concentrations which may cause adverse effects to resident populations of flora and fauna, as determined by the ecological risk evaluation.

picocuries - a unit of measure for radioactivity. One curie corresponds to 37 billion disintegrations per second; one picocurie is one trillionth of a curie, or in other words, 0.37 disintegrations per second.

Remediation goals, or cleanup levels, are established from the remedial action objectives given above. The upper target risk value given in the remedial action objective corresponds to a risk-based soil concentration. The remediation goal is the risk-based soil concentration. The risk-based concentration for the cesium-137 contamination is 23.3 **picocuries** per gram (pCi/gm), based on a 1 in 10,000 chance of excess risk.

Summary of Alternatives

The following five general alternatives and combinations of alternatives are consistent with the requirements of the National Contingency Plan (CERCLA), and the above RAOs are based on concentrations of contaminants that pose risks of 1 in 10,000. The RAOs are based on experience from previous cleanup actions at other INEEL sites with similar characteristics (i.e., types of contaminants present and affected environmental media) to focus the number of alternatives requiring evaluation and to accelerate the selection process. Continued operation of the ANL-W facility can impact the implementation of the remedial activity. Currently, ANL-W knows of only two sites (Sewage Lagoons and Industrial Waste Pond) that are currently receiving discharge waters that could impact the implementation of the preferred alternative. This is because contaminants released from ANL-W do not show an adverse effect on the Snake River Plain Aquifer, no groundwater remedial alternatives were considered. However, continued monitoring is recommended in the future to ensure early detection of contaminants, even though the modeling indicates that contaminants will not impact the Snake River Plain Aquifer. The duration for the continued monitoring varies between alternatives and depends on whether or not the contaminants remain at ANL-W, or are removed and disposed of elsewhere. A brief description of each alternative identified for the contaminated soil and sediments at ANL-W site follows.

Alternative 1, No Action (with monitoring). The no action alternative does not involve remedial actions and serves as the baseline for evaluating other remedial action alternatives. This alternative will include environmental monitoring, but does not include actions to reduce potential exposure pathways, such as fencing or land userestrictions. It is anticipated that the sediment, air, and groundwater monitoring would be completed semiannually in accordance with the ANL-W and INEEL-wide comprehensive monitoring programs. ANL-W anticipates that the environmental monitoring would continue for at least the 100 year institutional control period.

Alternative 2, Limited Action. A limited-action alternative was developed that involves only institutional controls to remain in effect for a minimum of 100 years. This alternative essentially continues management practices currently in place at ANL-W. Actions under this alternative focus on routine maintenance and upkeep of the drainage ditches and disposal pond, restricting access (fences and land use restrictions), and environmental monitoring including radiation surveys. Current management practices are in place that implement the requirements of the Atomic Energy Act, DOE orders and procedures, and ANL-W specific work procedures to protect worker safety and health. A partial list of the types of programs and procedures that will be followed include worker medical monitoring, work control, exposure limits, training requirements, and access controls such as security fences, barriers, signs, and postings. Actions under this alternative would focus on restricting access, routine maintenance, and environmental monitoring (as described above for the No Action with monitoring alternative). This alternative was screened from the detailed analysis of the alternatives because it does not meet the remedial action objectives. However, parts of this alternative such as continued management practices and access restrictions have been added to other alternatives to ensure protection of human health and the environment.

Alternative 1

No Action:

- Contamination would be left in place
- Environmental monitoring would be necessary for at least 100 years
- Decision would be reviewed every 5 years

Alternative 2

Limited Action:

- Contamination would be left in place
- Institutional control including access restrictions (fences), land use restrictions, and management control procedures to limit access.
- Environmental monitoring would be necessary for at least 100 years
- Decision would be reviewed every 5 years

Alternative 3

Containment:

- Contamination would be left in place
- Two containment covers were evaluated, a multi-layer engineered cover and a native soil cover.
- Environmental monitoring would be necessary for at least 100 years
- Record of Decision would be reviewed every 5 years

Alternative 3, Containment with Institutional Controls. This alternative involves both containment of 19,400 cubic yards of contaminated material and institutional controls for monitoring potential migration. Containment refers to a remedy that limits migration of contaminants from a waste site. Two containment types were considered for ANL-W, the first was Containment with Engineered Cover (Alternative 3a) and the second was Containment with a Native Soil Cover (Alternative 3b).

- An Engineered Cover consists of several layers of geologic materials (i.e., rip rap, cobble, and gravel). It was originally designed for stabilization of abandoned uranium mill tailings. This design was recently constructed at the INEEL Stationary Low-Power Reactor-1 burial ground site. Figure 4 shows a cross sectional view of the Engineered Cover.
- A Native Soil Cover consists of a thick layer (i.e., minimum of 10 feet) of native soil with surface vegetation, rock armor, or other surface cover.

Through isolation of contaminants, potential exposure pathways to human or environmental receptors are reduced. Human health risks from cesium-137 will be at acceptable levels within 130 years, due to radiological decay. The native soil cover was screened from consideration because studies on the INEEL have shown that certain native plants have tap roots that extend down to 40 feet below the land surface and the containment technologies must be designed to maintain integrity for as long as the contaminant levels remain at unacceptable levels. The native plants could draw contaminants out of the soil via the root system and store contaminants in the roots, stems, and leaves. This would expose the animals who eat the plants to the contaminants. In addition, the native soil cover is less resistant to intrusion by burrowing animals and offers a lesser degree of permanence than the engineered cover.

Institutional controls are assumed to remain in effect for at least 100 years. These institutional controls would include cover integrity monitoring and maintenance, surface water diversions, land use and access restrictions, and 100 year long term environmental monitoring (air, sediment and groundwater). The 100 year long term environmental monitoring would be required because the contaminants would remain at the site and no reduction in toxicity or volume is provided by the contaminant cover. The cover integrity monitoring would be used to verify the integrity of the cover remains intact and the environmental monitoring would provide early detection of potential contaminant migration. The need for additional environmental monitoring would be evaluated and determined by the agencies during subsequent 5-year reviews.

Alternative 4

Excavation and Disposal:

- Contamination would be removed from ANL-W
- Two disposal actions were evaluated, one on-site proposed INEEL Soil Repository and the other an off-site private disposal company.

Alternative 4, Excavation and Disposal. This alternative involves complete removal of 19,400 cubic yards of contaminated material from the ANL-W site and disposal of the soil in an off-site soils repository location. The soils remaining at ANL-W would meet the remediation goals that have been established for the contaminants. The excavation technologies considered include conventional heavy equipment including backhoes, dozers, graders, front end loaders, dump trucks and potentially rail transit to move the contaminated soils to a disposal facility. Dust

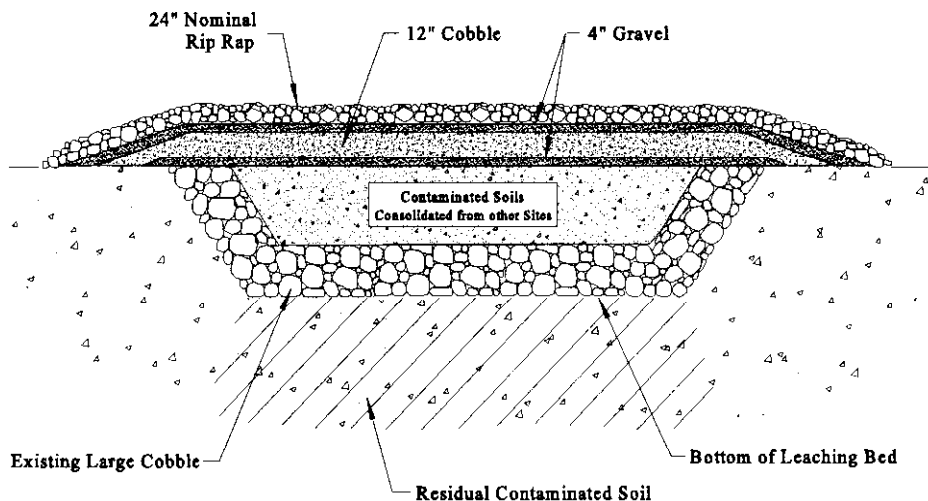


Figure 4. Cross-sectional View of Engineered Cover for Alternative 3a

suppression measures would be taken to ensure windblown migration of contaminants does not occur. Sampling at each site would be necessary after the removal to verify that the remediation goals have been met. Backfilling of the soils along with regrading would be required at each of the sites after the remediation goals have been met.

Soil disposal sites considered include the use of a proposed on-site proposed INEEL Soil Repository or other proposed on-site low-level radioactive-contaminated soil repositories (alternative 4a) and a private off-site disposal facility (alternative 4b). Both of these alternatives would remove the contaminated soils at ANL-W and eliminate the need for monitoring and maintenance activities, surface water diversions, land use and access restrictions, and long term environmental monitoring (air, sediment and groundwater).

Alternative 5, Phytoremediation. Phytoremediation is an innovative/emerging technology that utilizes plants to uptake toxic metals and radionuclides through roots in situ. Plants that have been used successfully in the past include grasses, shrubs, and/or trees. Phytoremediation would be used to treat the 19,400 cubic yards of contaminated soils at ANL-W to remove the metals and the radionuclides from the soils via normal uptake mechanisms of the plant. The plant vegetation is then harvested, sampled, and shipped to an incinerator on the INEEL for volume reduction. The resultant ash will then be sampled and sent to a permitted disposal facility.

The effectiveness and technical implementability of phytoremediation are very site-specific. ANL-W estimates that five growing seasons would be required to meet the established Remedial Action Objectives. This estimate assumed natural decay of the cesium-137 along with five percent uptake by the plants. Sample results of the ANL-W sites show the contaminants are predominantly bonded in the upper foot of

Alternative 5

Phytoremediation:

- Plants will be used to remove the contamination from the soils. The plant matter will be harvested, baled, and sent to an on-site incinerator for volume reduction. The remaining ash will be sent to an approved disposal facility.

Evaluation Criteria

Threshold Criteria:

1. **Overall Protection of Human Health and the Environment** addresses whether a remedy provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.
2. **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)** addresses whether a remedy will meet all of the ARARs under federal and state environmental laws and/or justifies a waiver.

Balancing Criteria:

3. **Long-term Effectiveness and Permanence** refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met.
4. **Short-term Effectiveness** addresses any adverse impacts on human health and the environment that may be posed during the construction and implementation period and the period of time needed to achieve cleanup goals.
5. **Reduction of Toxicity, Mobility, or Volume through Treatment** addresses the degree to which a remedy employs recycling or treatment that reduces the toxicity, mobility, or volume of the contaminants of concern, including how treatment is used to address the principal threats posed by the site.
6. **Implementability** is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.
7. **Cost** includes estimated capital and operation and maintenance costs, expressed as net present-worth costs.

Modifying Criteria:

8. **State Acceptance** reflects aspects of the preferred alternative and other alternatives that the state favors or objects to, and any specific comments regarding state ARARs or the proposed use of waivers.
9. **Community Acceptance** summarizes the public's general response to the alternatives described in the proposed plan and in the remedial investigation/feasibility study, based on public comments received.

soils. Thus, most of the contaminants are already within the plant root zone and no major movement of soil is necessary. The plants would require additional irrigation and soil amendments and the plant stalks along with the wetted soil would help control the spread of windblown contaminants. ANL-W will conduct a bench-scale testing of soils during the winter of 1997 and 1998 to determine applicability of this remedial alternative. ANL-W will be testing native and non-native INEEL plant species for their applicability for phytoremediation. If non-native INEEL plant species are selected, the plants will be harvested before they go to seed.

It is anticipated that phytoremediation will remove contaminants to acceptable levels after five field seasons as defined by the RAOs for the contaminated soils at ANL-W. This will eliminate the need for monitoring and maintenance activities, surface water diversions, land use and access restrictions, and long term environmental monitoring (air, sediment and groundwater).

Comparison of Alternatives

Each of the alternatives was evaluated using eight of the nine evaluation criteria identified under CERCLA. The ninth evaluation criteria is community acceptance and will be evaluated based on comments received during the public comment period. The first seven criteria were used to determine the ranking of each alternative with respect to the other alternatives. The eighth evaluation criterion, state acceptance, represents the concurrence of the Idaho Department of Health and Welfare in the selection of the preferred alternative. Alternative 1, "No Action," does not meet the threshold criterion of protection of human health and the environment which eliminates this alternative from further consideration and therefore it is not included in the comparison of alternatives. The complete evaluation of all alternatives and the evaluation criterion is found in Section 10.3 of the OU 9-04 Comprehensive RI/FS. Table 3 shows the comparative ranking of each of the retained alternatives with respect to each other. Each alternative was given a ranking from (best) to (worst) for each of the seven criteria to be evaluated. Since the rankings of the alternatives for the sites with human health and ecological risks are the same, only one table is used to show the results.

Overall Protection of Human Health and the Environment

The primary measure of this criterion is the ability of an alternative to achieve Remedial Action Objectives (RAOs) for the sites. Since this is a threshold criterion, each alternative must be able to meet the RAOs in order for the alternative to be retained. Alternative 4a, 4b, and 5 would provide the best long-term protection of human health and the environment because the soils would be removed or the concentrations would be reduced to acceptable levels. Alternatives 4a and 4b (conventional excavation and landfill disposal) would accomplish this by removing the contaminated soil from the ANL-W site. Alternative 3a is ranked lower than Alternative 4a, 4b, and 5 because it would not prevent unacceptable exposure of the cesium-137 after the 100-year DOE control period. Alternative 1 (no action) would not prevent exposures resulting in risks greater than 1E-04 and this alternative is therefore eliminated from further consideration.

Table 3. Summary of Comparative analysis ranking of remedial alternatives.

Evaluation Criteria	Alternative			
	3a	4a	4b	5
Overall Protection of Human Health and the Environment	●	●	●	●
Compliance with Applicable and Relevant and Appropriate Requirements	●	●	●	●
Long-term Effectiveness and Permanence	○	●	●	●
Short Term Effectiveness	○	●	●	●
Reduction of Toxicity, Mobility, or Volume Through Treatment	○	○	○	●
Implementability	●	●	●	●
Cost	○	●	○	●

● = Best ● = Good ○ = Worst

Compliance with ARARs

Compliance with ARARs is also a threshold criterion, each alternatives must be able comply with the ARARS in order for the alternative to be retained. For this criterion alternative 5 is ranked the highest because the non-invasive treatment of the contaminated soils would result in no emissions of fugitive dust. Alternatives 3a, 4a, and 4b are ranked equally, since all are considered equally capable of achieving compliance through use of engineering controls to meet the State of Idaho regulations for controlling emissions of fugitive dust and toxic substances and other **ARARs**.

Long-Term Effectiveness and Permanence

Alternative 5 would provide the highest degree of long-term effectiveness and permanence, because the contamination would have been reduced to acceptable levels for this criterion. Alternative 4a and 4b provide the next highest degree of long-term effectiveness and permanence, because contaminated soil exceeding cleanup goals would no longer exist at the sites. Alternative 3a would be effective as long as the cap prevents human and biotic intrusion as well as resistance to erosion.

Short-Term Effectiveness

These WAG 9 sites are not located near inhabited areas and no public roads are in the vicinity. Thus, no significant impacts to surrounding communities would be anticipated from exposure to contaminants during remediation in the WAG-9 sites. However, there is a potential short-term impact to workers who will be conducting the remedial action. Alternatives 4a, 4b, and 5 are equally ranked and higher than Alternative 3a, because the wastes would remain on site and only have to be moved once. Alternative 3a is ranked the lowest because the soils would have to be handled twice, once for the removal from the ditches and once when the soils are consolidated into the cap.

applicable or relevant and appropriate requirements (ARARs)
 - "Applicable" requirements mean those standards, criteria, or limitations promulgated under federal or state law that are required specific to a substance, pollutant, contaminant, act, location, or other circumstance at a CERCLA site.
 "Relevant and Appropriate" requirements mean those standards, requirements, or limitations that address problems or situations sufficiently similar to those encountered at the CERCLA site such that their use is well suited to that particular site.

INEEL Information Repositories

INEEL Technical Library
DOE-ID Public Reading Room
1776 Science Center Drive
Idaho Falls, ID 83415
(208) 526-1185

Shoshone-Bannock Library
HRDC Building
Bannock and Pima Streets
Fort Hall, ID 83202
(208) 238-3882

University of Idaho Library
University of Idaho Campus
Moscow, ID 83843
(208) 885-6344

Reduction of Toxicity, Mobility, or Volume Through Treatment

This criterion applies only to Alternative 5 because it is the only treatment alternative that was retained for detailed analysis. In addition to providing treatment to remove the contaminants from the soil, Alternative 5 also reduces the volume of contaminants to be disposed. A huge reduction in volume is anticipated by using phytoremediation with incineration as compared to excavation and disposal. The other alternatives were ranked lowest since they do not reduce the toxicity, mobility, or volume of the contaminated soils.

Implementability

Each of the alternatives retained for detailed analysis is technically implementable. The relative ranking of the alternatives with respect to implementability is shown in Table 3. Alternatives 3a, 4a, and 4b are equally ranked because they will require the procurement of a heavy construction contractor, transport of equipment, permits, and coordination with other on-site and off-site contractors. These permits would consist of safe work permits, digging permits, radiation safe work permits, and transportation placards. Alternative 5 is ranked the lowest because we are not sure if it will meet the RAOs within the timeframe. The potential success of Alternative 5 will be determined through bench-scale tests and field tests conducted after the ROD. If Alternative 5 is utilized, ANL-W personnel can sow and harvest the plants and farming equipment is commercially available.

Cost

Separate line item costs are developed for the primary components of each remedial action alternative, such as monitoring; capping; excavation; disposal; and reporting requirements such as remedial design/remedial action scope of work, remedial design/remedial action work plans, safety documentation, and progress reports. The estimated present worth cost of each alternative is shown in Table 4 and the relative ranking for this criterion is shown in Table 3.

Table 4. Total Present Worth Costs for all Alternatives at WAG 9.

Alternative	Capital Costs	Operations and Maintenance Costs	Total Cost
Alternative 3a	\$6,625,000.00	\$954,000.00	\$7,580,000.00
Alternative 4a	\$5,340,000.00	\$535,000.00	\$5,876,000.00
Alternative 4b	\$12,591,000.00	\$535,000.00	\$13,126,000.00
Alternative 5	\$2,289,000.00	\$535,000.00	\$2,824,000.00

State Acceptance

The Proposed Plan has been Prepared and issued with the concurrence of the Idaho Department of Health and Welfare.

Summary of the Preferred Alternative for the ANL-W Sites of Concern

Although the contaminated soil types (radiologically contaminated soil and soil contaminated with nonradioactive inorganic constituents) were evaluated separately against the evaluation criteria, both soil types produced similar rankings of the remedial alternatives. The overall ranking order of the alternatives is 5, 4a, 3a, and 4b. Thus, the information presented in the following paragraph presents the results of the ranking of soil types along with the justification for the selection of the preferred alternative.

Each of the alternatives, with the exception of the no action alternative (Alternative 1), would meet the remedial action objectives associated with the protection of human health and the environment. Alternative 1, No Action, does not meet the threshold criteria of overall protection of human health and the environment, but it serves as a baseline to determine the benefits of the other alternatives. Alternative 2, Limited Action was screened prior to the detailed analysis of the alternatives because by itself it does not meet the threshold criteria of overall protection of human health and the environment. However, certain limited action items such as access restrictions, land use restrictions, and monitoring are employed in Alternatives 3a, 4a, and 5. Alternatives 3a, 4a, and 4b meet all the remedial action objectives and provide overall protection of human health and the environment. But, these alternatives do not use treatment to reduce the toxicity, mobility, or volume of the contaminants. They do however eliminate the potential exposure of human and ecological receptors to the contaminants. Although Alternatives 3a, 4a, and 4b use similar containment technology to reduce the exposure of the contaminants to humans and the environment, Alternative 4a was ranked higher than Alternatives 3a and 4b because of the lower present value costs. Alternative 5 is the only alternative that uses a technology to reduce the toxicity, mobility, and volume of the contaminated media. In addition, the costs of using phytoremediation are less than the costs of Alternatives 3a, 4a, and 4b. Alternative 5 can be used for both radiologically and inorganically contaminated soils and provides a barrier against windblown contamination. Alternative 5 best meet the first seven evaluation criteria and is therefore the preferred alternative. Alternative 5, reduces the mass of contaminated material that will be disposed after incineration to less than one percent of the mass of the contaminated soil. After the anticipated five field seasons for phytoremediation, the concentrations of contaminants in the soils will meet the established RAOs and the soils can be utilized without any land use or access restrictions.

The actual use of Alternative 5 to treat the contaminated soils at ANL-W to meet the remediation goals depends on results of the bench-scale testing. These bench-scale tests have already been initiated as part of the screening of alternatives and the results will be available in the spring of 1998. If the phytoremediation tests indicate that it does not work on ANL-W soil types, Alternative 5 will be replaced with Alternative 4a as the preferred alternative. Alternative 4a would also be implemented if Alternative 5 is selected in the Record of Decision based on favorable bench-scale tests but after completion of two field seasons, the sample results indicate that the use of phytoremediation is time prohibitive in meeting the remediation goals. The two year field test of phytoremediation currently scheduled for 1998 and 1999 would not delay the removal of soil from ANL-W since the facility required for contingent Alternative 4a (the proposed INEEL Soil Repository), would not open until the fall of 2001 pending comments and approval.

More INEEL Information

General information concerning INEEL's mission and its major programs can be found in INEEL Information Repositories. Visit one of the repositories or call (800) 708-2680 to ask about INEEL activities or request background information.

The following is an abbreviated title list of the primary documents available for public review in the Administrative Record:

- Final Scope of Work for Waste Area Group 9 Comprehensive Remedial Investigation/Feasibility Study at the Idaho National Engineering Laboratory, November 1995.
- Final Work Plan for Operable Unit 9-04: Comprehensive RI/FS, August 1996.
- Comprehensive Remedial Investigation/Feasibility Study for Argonne National Laboratory - West Operable Unit 9-04, November 1997.

Other documents available for public review in the Administrative Record include Track 1 Decision Documentation Packages and Track 2 Summary Reports.

Preferred alternative - the protective, ARAR compliant remedy that is judged to provide the best balance of tradeoffs with respect to the five primary balancing criteria (sidebar on page 16).

No Action Sites

The No Action designation signifies that there is no source, pathway, or unacceptable risk at the present time for the current/future occupational scenarios and/or 100- years from now for the future residential scenario. The OU 9-04 Comprehensive RI/FS has assessed the contaminants, pathways, and risks for the 37 sites identified in the FFA/CO for WAG 9 and also the WAG 10 sites at ANL-W. The agencies have reviewed and commented on the OU 9-04 Comprehensive RI/FS and together with DOE propose that No Action be taken under CERCLA at these sites. A brief description of each of these No Action sites, that have been separated by Operable Unit follows. Figure 1-1 of the OU 9-04 Comprehensive RI/FS report shows the locations of these sites.

Operable Unit 9-01 (OU 9-01)

This OU consists of ten sites (ANL-04, -019, -28, -29, -30, -36, -60, -61, -62, and -63) that were identified in the FFA/CO. These ten sites consisted predominantly of low hazard miscellaneous sites with small discharges or construction wastes. Of the ten OU 9-01 sites, only two sites (ANL-04 and -61) were retained for further evaluation in the OU 9-04 Comprehensive RI/FS. The OU 9-04 Comprehensive RI/FS indicates that only ANL-04, the ANL-W sewage lagoons, pose unacceptable risks to the environment as was shown earlier in this proposed plan. A brief history of the other nine OU 9-01 sites that do not pose unacceptable risk follows:

Sludge Pit W of T-7 (Imhoff Tank) (ANL-19)—The Imhoff Tank and sludge pit collected sanitary waste from the power plant (Bldg. 768), the Fuel Conditioning Facility (Bldg. 765), the Laboratory and Office building (Bldg. 752), and the Fire House (Bldg. 759). The Imhoff Tank was used to settle out the sanitary wastes from 1963 to 1966. No potential source of hazardous materials is known to be associated with this site.

EBR-II Sump (ANL-28)—The EBR-II Sump is a 2,500-L (660-gal) underground coated carbon steel tank, 1.5 m (5 ft) in diameter by 1.4 m (4.5 ft) in depth located off the southwest corner of the Power Plant (Bldg. 768). The Sump is believed to have been installed in the early 1970s and is currently in use. The tank is a centralized collection facility for auxiliary cooling tower blowdown, ion exchange regeneration effluent, and small quantities of laboratory chemicals from the water chemistry laboratory in the Power Plant before discharging via a pipe to the Main Cooling Tower Blowdown Ditch. Currently, the Power Plant is not operating, but minor volumes of water chemistry water are still being discharged to the Main Cooling Tower Blowdown Ditch. No potential source of hazardous materials is known to be associated with this site.

Industrial Waste Lift Station (ANL-29)—The Industrial Waste Lift Station was and 789), and the Fuel Manufacturing Facility (Bldg. 704). The only contaminant of potential concern identified from process knowledge of water released to the

Industrial Waste Lift Station is silver. A **Track 1** investigation was originally performed for this site and, based on the above information, it was determined that the potential health risks are less than the lower limit of the NCP target risk range.

Sanitary Waste Lift Station (ANL-30)—The Sanitary Waste Lift Station (Bldg. 778) was built in 1965. It receives all sanitary waste originating at ANL-W, with the exception of the Transient Reactor Test Facilities (Bldgs. 720, 721, 722, 724, and T-15), the Sodium Process Facility operations trailer, and the Sodium Components Maintenance Shop (Bldg. 793). The only waste discharged to the lift station was silver from photographic film development. The maximum detected silver concentration of 68 mg/kg was less than the lowest risk-based soil concentration across all exposure pathways of 1,350 mg/kg.

TREAT Photo Processing Discharge Ditch (ANL-36)—The Transient Reactor Test Photo Processing Discharge Ditch is located approximately 6.1 m (20 ft) northeast of and parallel to the Photo Lab (Bldg. 724) and the TREAT Office Building (Bldg. 721). Approximately 1,500 L (400 gal) of photo processing solutions are estimated to have been discharged to the ditch over the 2-year period from 1977 to 1979. The maximum detected silver concentration of 17 mg/kg was less than the risk-based soil concentration across all exposure pathways.

Knawa Butte (ANL-60)—The Knawa Butte is located due north of the Hot Fuel Examination Facility (Bldg. 785) near the security fence. The butte was used as a construction refuse pile until September 1972 when a service request was made to renovate the existing pile and convert it to a doughnut-shaped mound. The butte consists primarily of clean soil and rock excavated from ANL-W facility basement construction. No potential source of hazardous constituents is known to be associated with this site.

EBR-II Transformer Yard (ANL-61)—The EBR-II Transformer Yard located south of the EBR-II Power Plant (Bldg. 768) is the site of PCB and diesel fuel contamination. The PCB contamination is due to historic (i.e., prior to 1978) leakage from four transformers. All four transformers were replaced and the majority of the contaminated soil was removed during a cleanup action from 1988 through 1992. An additional area of PCB contaminated soil adjacent to an underground diesel storage tank was identified for removal. The PCB contaminated soil and underground diesel storage tank were removed in the summer of 1997. Verification samples were collected after removal and show that the remaining PCB contamination was cleaned to the risk based cleanup levels

Sodium Boiler Building Hotwell (ANL-62)—The Sodium Boiler Building (Bldg. 766) condensate hotwell, built in 1962, is located north of the EBR-II Power Plant (Bldg. 768). This hotwell, which is identical to the EBR-II Power Plant condensate hotwell, receives water from the steam trap and condensate drains. Neither hazardous constituents (hydrazine and tritium) believed to have been present at the site were detected.

Track 1 - an area or group of areas which is believed to have a low probability of risk. Sufficient information is available to evaluate the area and recommend a course of action.

FFA/CO Operable Unit 9-01
Track 1 Sites

ANL-04, Sewage Lagoons
ANL-19, Sludge Pit
ANL-28, EBR-II Sump
ANL-29, Industrial Waste Lift Station
ANL-30, Sanitary Waste Lift Station
ANL-36, TREAT Photo Processing Discharge Ditch
ANL-60, Knawa Butte Debris Pile
ANL-61, EBR-II Transformer Yard
ANL-62, Sodium Boiler Building (766) Hotwell
ANL-63, Septic Tank

Septic Tank 789-A (ANL-63)—This septic tank is located approximately 18 m (60 ft) northeast of the Equipment Building (Bldg. 789-A) and was believed to have been installed in the late 1950s. No potential source of hazardous materials is known to be associated with this site.

Operable Unit 9-02 (OU 9-02)

OU 9-02 consists of one site (ANL-08, EBR-II Leach Pit) identified in the FFA/CO. The EBR-II Leach Pit is located between the inner and outer security fences in the southwest corner of the ANL-W facility. The Leach Pit was an irregularly shaped, unlined underground basin that was excavated with explosives into basalt bedrock in 1959. The Leach Pit was used to dispose of ANL-W liquid industrial waste including cooling tower blowdown, sanitary effluent, cooling condensates, and radioactive effluent, until 1973. The average annual discharge to the Leach Pit was approximately 9×10^4 gallons from 1960 to October 1973 containing a total of 10.4 curies of radioactivity. The majority of the sludge was removed during an *interim action* in December 1993, after which the bottom of the Leach Pit was lined with 5 to 7 cm (2 to 3 in.) of bentonite clay and backfilled to grade. A risk assessment performed on the concentration of the contaminants in the basalt and in the remaining sludge indicates that the total potential risk is $6E-06$ from ingestion of groundwater contaminated with beryllium and neptunium-237, which is at the lower limit of the NCP target risk range (i.e., $1E-06$). A *Track 2* Summary Report was completed and signed by the RPMs that recommended additional evaluation of the vadose zone below the Leach Pit in the OU 9-04 Comprehensive RI/FS. The additional sampling and modeling of the contaminants in the vadose zone in the OU 9-04 Comprehensive RI/FS show no unacceptable risks. The Leach Pit site along with the vadose zone are now recommended as requiring No Action.

Operable Unit 9-03 (OU 9-03)

OU 9-03 consists of three sites (ANL-05, -031, and -34) that were identified in the FFA/CO. These three sites had all received potentially hazardous chemicals that required additional sampling in order to determine the risks to human health and the environment. Of the three OU 9-03 sites, are recommended for No Action based on results in the *Track 2* Summary Report.

ANL Open Burn Pits 1, 2, and 3 (ANL-05)—Three abandoned open burn pits are located at ANL-W. The pits were initially used to burn construction wastes, such as paper and wood in the early 1960's. In addition, approximately 150 gals of organic wastes from analytical chemistry operations were disposed in the burn pits from 1965 to 1970. The organic wastes consisted primarily of toluene, xylene, hexane, isopropyl alcohol, butyl cellosolve, tributylphosphate, and mineral oil. A risk assessment was performed on the results of the sampling that indicates that the potential risk from exposure to all contaminants detected is less than the lower limit of the NCP target risk range.

Interim Action - an action taken to mitigate a clear, unacceptable risk at a site when there is sufficient data to assess the risk and select an action.

Track 2 - an area or group of areas which does not have sufficient data available to make a decision concerning the level of risk or to select or design a remedy. Field data collection may be necessary.

FFA/CO Operable Unit 9-02 Track 2 Site

ANL-08, EBR-II Leach Pit

Industrial/Sanitary Waste Lift Station (ANL-31)—The Industrial/Sanitary Waste Lift Station (Bldg. 760) sanitary side is still used. However, the industrial side is inactive. In 1995, samples collected in the industrial side were analyzed for metals and radionuclides. The results indicated that several radionuclides pose a potential risk at the lower limit of the NCP target risk range. Therefore, under a best management practice, ANL-W removed the piping and contaminated soil from the Lift Station to the Meter House in November 1995. Also under a best management practice the remaining 27 m (90 ft) of the piping and soil from the Meter House to the EBR-II Leach Pit was removed in the summer of 1996. After the removals the verification samples collected showed that the remaining contaminants were below the risk based concentrations.

Fuel Oil Spill by Building 755 (ANL-34)—ANL-34 is the site of a 50-gal spill of #5 fuel oil from an above ground storage tank. The spilled fuel oil occupied an area approximately 1.5 m x 6.1 m (5 ft x 20 ft) and was confined within the bermed area. A risk assessment was performed on the most mobile (i.e., naphthalene) and the most hazardous (i.e., benzene) constituents of the fuel oil. The risk assessment indicates that the risk would be below the lower limit of the NCP target risk range.

Operable Unit 9-04 (OU 9-04)

OU 9-04 consists of five sites (ANL-01, -01A, -09, -35, and -53) that were identified in the FFA/CO. All five sites had received potentially hazardous chemicals that required additional sampling in order to determine the risks to human health and the environment. Of the five OU 9-04 sites, only ANL-53 does not have unacceptable risks and is recommended for No Action. The other four sites that pose unacceptable risks to human health or the environment will be remediated in accordance with the preferred alternative that will be documented in the Record of Decision.

The Cooling Tower Riser Pits (ANL-53)—The Cooling Tower Riser Pits are located approximately 3 m (10 ft) east of the Main Cooling Tower. Each of the four pits is approximately 3.7 m (12 ft) deep with 23 to 38 cm (9 to 15 in.) of soil covering the rock bottom. During winter shutdown periods of the Main Cooling Tower, the riser pipes were drained to prevent damage caused by freezing and the riser pits are used to collect this discharge. The risk assessment performed in the OU 9-04 Comprehensive RI/FS indicates that the risk to human health and the environment is less than the lower limit of the NCP target risk range.

Newly Identified Sites

Four potentially new sites were identified in 1994 from aerial photographs of the lands surrounding the ANL-W facility. The wastes in these four sites consisted primarily of construction debris and non-hazardous wastes. ANL-W has completed actions to remove the non-native debris from these areas and properly dispose of the wastes in the INEEL landfill. Using the new site identification form criteria, these four sites were screened from inclusion into the FFA/CO. A summary of the new site identification forms, photos, and cleanup actions is included in Appendix L of the OU 9-04 Comprehensive RI/FS.

FFA/CO Operable Unit 9-03 Track 2 Sites

ANL-05, Open Burn Pits
ANL-31, Industrial/Sanitary Waste Lift Station
ANL-34, Fuel Oil Spill by Bldg. 755

Operable Unit 10-06 (OU 10-06)

Two WAG 10 sites at or near ANL-W that contain radionuclide-contaminated soils have been investigated in the OU 10-06 RI/FS. The two sites are the ANL-W—Windblown area and ANL-W—Stockpile site. These two sites are located within a mile of WAG 9 and are now included in the OU 9-04 Comprehensive RI/FS because the wastes had originated at ANL-W. Additional information on these two sites can be found in the 10-06 administrative record under INEL-94/0037 and INEL-95/0259. These two OU 10-06 sites are being incorporated into the OU 9-04 record of decision. The following two sections describe a short summary of the radionuclides detected and the associated risks.

ANL-W Windblown Area (OU 10-06). This area actually consists of two areas, the windblown area around the remotely located TREAT reactor and the windblown area around the ANL-W facility. Soil samples were collected at both these facilities in 1993, and analytical results from soil samples collected by the Radiological and Environmental Sciences Laboratory (RESL, which is now called the Foundation) were used to evaluate risks from exposure to contaminants at the site. Risks for the current occupational exposure scenario and the future residential exposure scenario were within the NCP target risk range (i.e., 1E-04 to 1E-06). In addition to human health, risks to ecological receptors were also evaluated. This evaluation showed no unacceptable risks to populations of exposed ecological receptors.

ANL-W—Stockpile site. The ANL-W Stockpile is an abandoned borrow pit that was excavated as part of road building activities near ANL-W in the 1950s. borrow pit is located on the west side of the ANL-W entrance road and is approximately 300 ft long and 200 ft wide. In 1975, ANL-W personnel used the borrow pit to dispose of approximately 1,058 cubic yards of low-level radionuclide contaminated soil that resulted from cleanup operations at ANL-W. The Operable Unit 10-06 Phase II field investigation was conducted at the ANL-W Stockpile to determine the nature and extent of radionuclide- and metal- contaminated soils within the stockpile.

Radioactive hot spots were identified in the stockpile soil using field radiation survey instruments. Data were collected from three of the hot spots. The main radionuclide contaminant that contributed most of the risk was cesium-137, with concentrations up to 26,700 pCi/g. The human health risk assessment that was performed indicated that for the 100-year residential exposure the total risk is 5E-03, which is attributed to the external exposure (4E-03) and food crop ingestion (9E-04) from Cesium-137. In 1996, a non-time critical removal action was performed on the radionuclide contaminated stockpile site. The contaminated soils were removed using large excavation equipment and the soil was transported to the Warm Waste Pond at the Test Reactor Area. The preliminary remediation goal (PRG) for the Cesium-137 contaminated soil was 16.7 pCi/g and remaining soils were below this level. The remaining risks associated with this site is 1E-05 which is within the NCP target risk range.

FFA/CO Operable Unit 9-04 RI/FS Sites

ANL-01, Industrial Waste Pond and 3 Ditches
ANL-01A, Main Cooling Tower Blowdown
Ditch
ANL-09, Interceptor Canal
ANL-35, Industrial Waste Lift Station
Discharge Ditch
ANL-53, Cooling Tower Riser Pits

Public Involvement Activities

After you review this plan, you are encouraged to contact representatives of the DOE, INEEL Community Relations Plan office, State of Idaho, or Region 10 of the EPA. You may wish to ask questions, request a briefing, or seek additional background information regarding this proposed plan.

A public meeting will be held at the locations listed below. From 6:30 to 7 p.m., representatives from the agencies will be available to informally discuss any concerns and issues related to this proposed plan before the meeting begins. At 7 p.m., there will be a presentation by the agencies, followed by a question and answer session and an opportunity to provide written and/or oral comments. **A court reporter will record public comments received and will prepare a transcript of the public meetings.** Transcripts from all three public meetings will be available to the public in the Administrative Record Section of the INEEL Information Repositories under OU 9-04.

Boise

Tuesday, January 20
Borah High School
Library

Moscow

Wednesday, January 21
University Inn

Idaho Falls

Thursday, January 22
Shilo Inn

A court reporter will record public comments received and will prepare a transcript of the public meetings. - Transcripts from all three public meetings will be available to the public in the Administrative Record Section (Under Operable Unit 9-04) of the INEEL Information Repositories listed on page 20.

Notes:

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Comments continued. Attach additional pages if necessary.

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What's Your Opinion?

The agencies want and need to hear from you to effectively decide what actions to take at Argonne National Laboratory - West.

Comments:

(Continued on reverse)

INEEL Environmental Restoration Program
P.O. Box 2047
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